CLAIMS

1. An ignition device for internal combustion engine, containing:

- a main chamber (1) designed for including a main combustible mixture, and fitted with a compression system of said mixture, and
- an igniter (11) containing a precombustion chamber (2) designed for receiving reactants and an ignition system (13,14) of the reactants contained in the precombustion chamber (2), said precombustion chamber (2) being defined by a precombustion chamber body (12) having a head (12a) including at least one passageway (15), said head (12a) of the precombustion chamber body separating the precombustion chamber (2) from the main chamber (1) and communicating the precombustion chamber (2) and the main chamber (1) by dint of the passageway(s) (15),

characterised in that the head (12a) is coated at least partially externally with a coating layer (R) of at least one refractory material.

2. Ignition device according to claim 1 characterised in that the precombustion chamber body (12) is coated at least partially internally with a coating layer (R) of at least one refractory material.

3. An ignition device according to claim 1 or 2 characterised in that the passageway(s) (15) are coated with a coating layer (R) of at least one refractory material.

4. An ignition device according to claim 1, 2 or 3 characterised in that the coating layer (R) is a nano-structured coating layer, the size of the grains being greater than or equal to 1 nm and smaller than 1 000 nm.

5. An ignition device according to any of the previous claims characterised in that the coating layer (R) consists either of a layer of at least one refractory material, or of two layers of at least one refractory material.

6. An ignition device according to any of the previous claims characterised in that the refractory material(s) are selected among nitrides, borides, silicides, carbides, zirconium alloys, yttrium alloys, titanium alloys and boron alloys, oxides, preferably aluminium, titanium, iron, silicium, cerium, manganese and zirconium oxides, and zirconias having been subjected to the addition of at least one metal oxide selected among calcium, magnesium, yttrium, hafnium and rare earth oxides.

7. An ignition device according to any of the previous claims characterised in that the refractory material(s) are selected among Al_2O_3, SiO_2, CeO_2, MnO_2, ZrO_2, ZrY, Zr and Y being in stoichiometric proportions or not, and TiB_2, preferably among Al_2O_3, ZrY, Zr and Y being in stoichiometric proportions or not, and TiB_2.

8. An ignition device according to any of the previous claims characterised in that the thickness of the coating layer ranges between 0.5 and 100 µm, preferably between 1 and 50 µm.

9. An ignition device according to any of the previous claims characterised in that the passageway(s) (15) are of cylindrical shape and of diameter greater than 1 mm.

10. An ignition device according to any of the claims 1 to 8 characterised in that the passageway(s) (15) are capable of preventing the propagation of a flame front while enabling the propagation of unstable compounds derived from the combustion of the reactants contained in the precombustion chamber (2), the compression system of the main chamber (1) and the seeding of the main mixture with said unstable compounds enabling mass self-ignition of the main mixture.

11. An ignition device according to claim 10 characterised in that said passageway(s) (15) are in the form of a cylinder of diameter smaller than or equal to 1 mm.

12. An ignition device according to claim 10 or 11 characterised in that said passageway(s) have a length smaller than or equal to the diameter thereof.

13. An ignition device according to claim 10, 11 or 12 characterised in that:

- the upper section of the precombustion chamber body (12) is in the form of a cylinder of inner diameter Φ, and
- the head (12a) of the precombustion chamber body (12) comprises several passageways (15), said passageways (15) being circumscribed by a circular curve of diameter d_2 running through the centres of the outermost passageways (15), the ratio d_2/Φ being smaller than or equal to 0.5.

14. An ignition device according to the previous claim characterised in that the ratio d_2/Φ is smaller than or equal to 1/3.

15. An ignition device according to claim 13 or 14 characterised in that the centre of the curve running through the centres of the outermost passageways (15) is situated on the axis symmetry (2b) of the precombustion chamber (2).

16. An ignition device according to claim 13 or 14 characterised in that the centre of the curve running through the centres of the outermost passageways is situated at a distance d_3 from the axis symmetry (2b) of the precombustion chamber (2), said distance d_3 being equal to or greater than the quarter diameter Φ of the precombustion chamber (2).

17. An igniter for internal combustion engine containing a precombustion chamber (2) defined by a precombustion chamber body (12) having a head (12a) fitted with at least one passageway (15), the precombustion chamber being designed for including a combustible mixture, and an ignition system (13,14) of the combustible mixture contained in the precombustion chamber (2), characterised in that the head (12a) is coated at least partially externally with a coating layer (R) of at least one refractory material.

18. An igniter according to claim 17 characterised in that the precombustion chamber body (12) is coated at least partially internally with a coating layer (R) of at least one refractory material.

19. An igniter according to claim 17 or 18 characterised in that the passageway(s) (15) are coated with a coating layer of at least one refractory material.

20. An igniter according to claim 17, 18 or 19 characterised in that the refractory material(s) are selected among nitrides, borides, silicides, carbides, zirconium alloys, yttrium alloys, titanium alloys and boron alloys, oxides, preferably aluminium, titanium, iron, silicium, cerium, manganese and zirconium oxides, and zirconias having been subjected to the addition of at least one metal oxide selected among calcium, magnesium, yttrium, hafnium and rare earth oxides.

21. An igniter according to claim 20 characterised in that the refractory material(s) are selected among Al_2O_3, SiO_2, CeO_2, MnO_2, ZrO_2, ZrY, Zr and Y

being in stoichiometric proportions or not, and TiB_2 preferably among Al_2O_3, ZrY, Zr and Y being in stoichiometric proportions or not, and TiB_2.

22. An igniter according to any of the claims 17 to 21 characterised in that the thickness of the coating layer ranges between 0.5 and 100 µm, preferably between 1 and 50 µm.